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Today's
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Study: Cosmic Brake Slows Spin of Pulsars

By PAUL RECER
 AP Science Writer

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WASHINGTON -- Pulsars are the fastest spinning stars in the universe -- rotating at hundreds of revolutions per second -- and they could go twice as fast before flying apart. A new study by NASA suggests that these exotic stars are held together by gravitational radiation that puts on the brakes.

Observations by NASA's Rossi X-ray Timing Explorer of 11 pulsars found that there seems to be a natural limit on how fast the strange stars can spin, astronomers said Wednesday at a news conference.

"The fastest-spinning pulsars could technically go twice as fast, but something stops them before they break apart," said Deepto Chakrabarty, a Massachusetts Institute of Technology astronomer and the lead author of a study appearing in the journal Nature.

Chakrabarty called the natural brake "a cosmic speed limit" and said it may be the result of rotational energy being emitted from the stars as gravitational waves.

Pulsars are the remnants of stars that were once eight to 20 times bigger than the sun. When their fuel was exhausted, the stars exploded and then collapsed into a very dense body equal to about 1.5 solar masses, but measuring only about 10 miles across.

The collapse starts the pulsar spinning at about 30 turns a second.

If there is a nearby star, the pulsar, with its superior density,

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will begin pulling material from its stellar companion. As this material spirals into the pulsar, the spin of the star rapidly increases.

In theory, said Chakrabarty, the star could spin up to 3,000 revolutions per second and eventually fly apart.

But in the study, Chakrabarty said the researchers found that the maximum speed for the 11 pulsars analyzed was below 760 revolutions per second, a velocity that approaches about 20 percent of the speed of light.

Pulsars give off beams of energy, such as X-rays, from fixed points on their surface. Since the objects are rapidly spinning, the beams appear to rapidly blink on and off, or pulse. By measuring these pulses, astronomers can estimate the rate of spin.

Chakrabarty said that Lars Bildsten, a University of California, Santa Barbara, astrophysicist, had theorized that the spinning speed of pulsars would be limited because irregularities on the star's surface would allow rotational energy to stream away as gravitational waves.

Bildsten, who took part in a NASA news conference, said the observation by Chakrabarty and others was unusual because it actually supported with observations an astrophysical theory.

"We're usually proven wrong," Bildsten, "so this is kind of exciting."

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On the Net:

Pulsar study: <http://www.gsfc.nasa.gov/topstory/2003/0702pulsarspeed.html>

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